Fishery Data Series No. 12-64

Kanektok River Salmon Monitoring and Assessment, 2011

Annual Report for Project OSM 10-300
USFWS Office of Subsistence Management
Fisheries Resource Monitoring Program

by

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and

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November 2012

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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November 2012

This investigation was partially financed by U.S. Fish and Wildlife Service, Office of Subsistence Management (Project No. OSM 10-300), Fisheries Resource Monitoring Program under agreement number 70181AJ027.

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This document should be cited as:
Taylor, D. V., and T. B. Elison. 2012. Kanektok River salmon monitoring and assessment, 2011. Alaska Department of Fish and Game, Fishery Data Series No. 12-64, Anchorage.

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ABSTRACT

Kanektok River is the primary salmon spawning drainage in the Quinhagak area and supports subsistence, commercial, and sport fisheries. The Alaska Department of Fish and Game, in cooperation with U.S. Fish and Wildlife Service and the Native Village of Kwinhagak, has operated a resistance board weir on Kanektok River since 2001. The project estimates escapement and provides a platform to collect samples used in estimating age, sex, and length for Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, and coho *O. kisutch* salmon. In 2011, the weir was operational from 27 June through 15 August. Total escapement past the weir during the 2011 operational period was estimated at 5,032 Chinook, 84,805 sockeye, and 50,908 chum salmon and 30,788 Dolly Varden *Salvelinus malma*. The Chinook salmon escapement was the lowest recorded, while sockeye salmon had the second lowest escapement on record and the chum salmon escapement was near average. The Chinook salmon escapement comprised 78% males and was dominated by age-1.2 fish (59.2%). The sockeye salmon escapement comprised 49.2% males and was dominated by age-1.3 fish (48%). The chum salmon escapement comprised 48.1% males and was dominated by age-0.4 fish (53.8%).

Key words: Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, coho *O. kisutch*, sockeye *O. nerka*, salmon, Dolly Varden *Salvelinus malma*, rainbow trout *O. mykiss*, whitefish *Coregonus* spp., District W-4, Kanektok River, Kuskokwim Area, resistance board weir.

INTRODUCTION

The Kanektok River drainage flows into Kuskokwim Bay near the village of Quinhagak and provides an important annual fishery for subsistence and commercial harvest of salmon (*Oncorhynchus* spp.). The Kanektok River weir project estimates the escapement of Chinook (*O. tshawytscha*), sockeye (*O. nerka*), and chum salmon (*O. keta*) and was established in 2001 in an effort to develop a long term reliable data set, that could be used for management of the fishery. Escapement estimates combined with commercial catch statistics are used to assess daily run strength and provide abundance information that is critical to the management of the commercial salmon fishery in District W-4.

SALMON FISHERIES

Subsistence Fisheries

Subsistence fishing for salmon occurs in the Kanektok River, in nearby streams, and in Kuskokwim Bay. Salmon caught for subsistence use make an important contribution to annual subsistence harvests of residents from Quinhagak and nearby communities. The Alaska Department of Fish and Game (ADF&G) has quantified subsistence harvests in the Quinhagak area since 1968, and methods have been consistent since 1988. From 1997 to 2006, annual subsistence harvests have averaged 3,337 Chinook, 1,522 sockeye, 1,238 chum, and 1,442 coho salmon (*O. kisutch*) (Bavilla et al. 2010).

Commercial Fishery

Commercial salmon fishing has occurred in the Quinhagak area since before statehood. In 1960, commercial fishing District W-4 was established offshore of Quinhagak in Kuskokwim Bay (Figure 1). Since the inception of District W-4, its northern boundary has been shifted between Weelung Creek and Oyak Creek in response to overcrowding issues and concern over the interception of fish bound for Kuskokwim River. In 2004, the Alaska Board of Fisheries extended the northern boundary three miles north up the coast from the southern edge of Oyak Creek to the northernmost edge of the mouth of Weelung Creek. The southern boundary is located at the southernmost edge of the mouth of Arolik River. The boundary area extends three miles from the coast into Kuskokwim Bay. The District W-4 commercial fishery targets Chinook, sockeye, and

coho salmon. Chum and pink (*O. gorbuscha*) salmon are harvested incidentally, with pink salmon being the least commercially valuable species.

Since 1960, commercial salmon harvests in District W-4 ranged from 3,918 to 273,553 salmon, with an historic average of 122,699 salmon. Total harvests have increased since the years of 2001 and 2002 when market demands and processing capacity were low. The most recent 10 year average harvest (2001–2010) was 180,966 salmon and the most recent 5 year average harvest (2007–2011) was 237,472 salmon. Additional information on the W-4 commercial fishery can be obtained in the *Kuskokwim area management report* (Brazil et al. 2011).

Sport Fisheries

In addition to commercial and subsistence harvest, Kanektok River also supports a popular sport fishery. Sport anglers target salmon, rainbow trout (*O. mykiss*), Dolly Varden (*Salvelinus malma*), and Arctic grayling (*Thymallus arcticus*) from mid-June to the beginning of September each year. Currently, three seasonal sport fishing guide camp operations are located on Kanektok River, along with numerous guided and non-guided anglers that float Kanektok River from its headwaters to the village of Quinhagak (J. Chythlook, Sport Fishery Biologist, ADF&G, Fairbanks, personal communication).

ESCAPEMENT MONITORING

In Alaska, ADF&G is responsible for managing salmon fisheries in a manner consistent with *Sustainable Salmon Fisheries Policy* (5 AAC 07.367). This task requires long-term monitoring projects that reliably measure annual escapement to key spawning systems as well as track temporal and spatial patterns in abundance that influence management decisions.

Kanektok River is the primary salmon spawning stream within District W-4. Establishing a viable method for monitoring and assessing salmon escapement in Kanektok River has been problematic (Estensen and Diesigner 2004). The first attempted monitoring project was a counting tower established in 1960 on the lower river near the village of Quinhagak (ADF&G 1960). This tower project was plagued by logistical problems, poor water visibility, and difficulties with species apportionment. In 1961, the tower was relocated to the outlet of Kagati/Pegati Lake (Figure 2) and operated through 1962 (ADF&G 1962). Although successful in providing sockeye salmon escapement information, operation of the tower at this site was discontinued after 1962. Enumeration using hydroacoustic sonar was attempted from 1982 through 1987, however, the use of sonar was deemed unfeasible because of technical obstacles, site limitations, and budget constraints (Huttunen 1988). In 1996, a cooperative effort between the Native Village of Kwinhagak (NVK), United States Fish and Wildlife Service (USFWS), and ADF&G reinitiated a counting tower located 25 km upriver from the mouth of Kanektok River. The counting tower again proved to have limited utility (Fox 1997) despite improvements to the project in 1998 (Menard and Caole 1999). In 1999, resources were redirected toward developing a resistance board weir (Burkey et al. 2001). The weir was operational briefly in 2000, but high water levels, technical limitations, and personnel problems precluded the project from meeting its objectives (Linderman 2000). During operation in 2000, the site was determined unsuitable for a weir because of extensive bank erosion.

In 2001, the weir was relocated approximately 33 km upriver from the original site (Estensen and Diesigner 2003). This relocation required a “Special Use Permit” from the USFWS to operate within the congressionally designated “Wilderness Area.” The weir was successfully installed

and operated in 2001; however, installation was delayed until 10 August because of high water. In 2002, an attempt was made to install the weir just after ice-out in early May, but high water still delayed complete installation until late June. In 2003, crews arrived on-site even earlier and successfully installed the weir during the last week of April, before snowmelt and spring precipitation raised water levels beyond a workable point. Installation and optimal operational start time of the weir was determined to be dependent upon early installation in late April, just after ice-out. When feasible, an early installation strategy has been employed annually since 2003. The weir no longer operates through the coho salmon season due to complications with high water during the coho salmon return. Since 1996, the project has continued as a cooperative venture between ADF&G, USFWS Togiak National Wildlife Refuge, USFWS Office of Subsistence Management (OSM), and NVK. As of 2010, formal escapement goals have not been developed for any species at this weir (Estensen et al. 2009).

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Salmon age, sex, and length (ASL) information has been collected from the weir project since 2001 and from District W-4 commercial harvest since 1969 (Molyneaux et al. 2010). Historical summaries of existing ASL information for salmon returning to the Kanektok River can be found in Molyneaux et al. (2010).

OBJECTIVES

1. Enumerate the daily passage of Chinook, sockeye and chum salmon through the Kanektok River weir.
2. Estimate the run timing of Chinook, sockeye, and chum salmon at the Kanektok River weir.
3. Estimate the age, sex, and length composition of the Chinook, sockeye, and chum salmon escapements proportionally such that 95% simultaneous confidence intervals for the age composition have a maximum width of ±10% (α=0.05 and d=0.10).
4. Estimate Dolly Varden daily passage and run timing through the Kanektok River weir.
5. Record atmospheric and hydrologic conditions at the weir site.

METHODS

SITE DESCRIPTION

The Kanektok River is located in the Togiak National Wildlife Refuge in southwestern Alaska (Figure 2). The Kanektok River watershed drains approximately 2,261 km^2 of surface area and empties into Kuskokwim Bay near the village of Quinhagak (Walsh et al. 2006). The upper portion of the river consists primarily of a single channel flowing through mountainous terrain. The lower portion of the river flows through a broad alluvial plain and is highly braided with many side channels. The surrounding riparian vegetation is composed primarily of cottonwood, willow, and alder and uplands are dominated by tundra. Chinook, sockeye, chum, coho, and pink salmon along with several other anadromous and resident species spawn in the Kanektok River drainage.

The Kanektok River weir is located approximately 68 km upstream from the mouth at 59°46.057'N, 161°03.616'W. The channel width is approximately 76 m wide. The water depth

during weir operations ranges from approximately 0.3 to 1.8 m deep. The bottom substrate is primarily cobblestone, gravel, and sand.

RESISTANCE BOARD WEIR

The design, construction, and installation of the Kanektok River resistance board weir largely followed those described in Stewart (2002 and 2003) and Tobin (1994). Additional details concerning the resistance board weir components used on Kanektok River are described in Estensen and Diesinger (2004) and Pawluk and Jones (2007).

Two fish passage chutes were installed on the weir, one approximately 30 m from the south bank and the other approximately 8 m from the north bank. Gates were attached on both chutes to regulate fish passage. Live traps installed directly upstream of both passage chutes were used to collect fish for age, sex, and length sampling. Picket spacing (4.3 cm between pickets) allowed smaller fish, such as pink salmon and other non-salmon species, to pass through the weir between pickets. Downstream migrating fish passing over or through the weir were not enumerated.

Boats passed at a designated boat gate as described in Estensen and Diesigner (2004). Boats with jet-drive engines were the most common and could pass over the boat gate panels independent of the crew by reducing speed. Rafts could pass downstream by submerging the boat passage panels and drifting over the weir. Boats with propeller-drive engines were uncommon and required being towed upstream across the weir with the assistance of crew members.

ESCAPEMENT MONITORING AND ESTIMATES

To determine salmon escapement past the weir, fish passage counts were made daily during the operational period of the project. Passage counts occurred regularly throughout the day, typically for 1–2 hour periods, beginning in the morning and continuing as late as light permitted. During counting periods, fish passage chute gates were opened allowing fish through the weir. Crew members identified and enumerated all fish by species as they passed upriver through the chutes. Any fish observed in the live trap, returning downstream through the fish passage chutes were not included in the upstream tally.

AGE, SEX, AND LENGTH SAMPLING AND ESTIMATES

Sample sizes were calculated using Bromaghin (1993) and adjusted for a non-readable scale rate of 20%; such that sample sizes would produce simultaneous 95% confidence interval estimates of age composition ±10% for each age category (α=0.05 and d=0.10). The sample size for Chinook salmon was adjusted for a finite population. Sample sizes of sockeye and chum salmon were increased by a factor of three to allow for postseason stratification. The minimum sample size objective for each species was 228 Chinook, 648 sockeye, and 605 chum salmon.

Daily sample objectives were based on a proportional sampling design. Daily sample proportions were 0.04 for Chinook, 0.01 for sockeye, and 0.02 for chum salmon. The population estimates were based on the lowest escapements observed at the weir. Therefore, the daily Chinook salmon sample size was 0.04 of the previous day's passage. When daily sample objectives were not met attempts were made to collect additional samples during the next opportunity. Ultimately, it was up to the crew leader to determine the appropriate sample sizes and schedule based on fish passage patterns and minimum sample size objectives as outlined above.

The weir crew conducted active sampling as needed, to aid in achieving Chinook, sockeye, and chum salmon sample goals. Active sampling consisted of capturing and sampling target species of salmon while actively passing and enumerating all other fish. Crew members used a dip net to capture fish within the holding box. Fish were removed from the dip net and placed on a partially submerged fish measurement cradle. Scales were removed from the preferred area of the fish (INPFC 1963). A minimum of three scales were removed from each Chinook salmon, and one scale was removed from each chum and sockeye salmon. Scales were mounted on numbered and labeled gum cards. Sex was determined by visually examining external morphology such as the development of the kype, roundness of the belly, and the presence or absence of an ovipositor. Length was measured to the nearest millimeter from mideye to tail fork. After sampling, fish were released upstream of the weir. Gum cards and data forms were completed and returned to the Bethel ADF&G office for processing.

ADF&G staff in Bethel and Anchorage processed age, sex, and length data and generated data summaries as described by Molyneaux et al. (2010). Samples are divided into three strata based on cumulative percent passage. Each stratum was then weighted by the number of fish passing in each stratum to estimate the overall age and sex composition. Age and sex confidence interval bounds were estimated to determine if the desired precision was met for the season estimate. If the desired precision level was met then the season summary was the weighted estimate of the escapement. If the desired precision level was not met then the season summary was not applied to the escapement and only the composition of the samples was presented.

Ages were reported in the tables using European notation. European notation is composed of two numerals separated by a decimal, where the first numeral indicates the number of winters spent in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age is equal to the sum of these two numerals plus one to account for the single winter of egg incubation in the gravel. Original ASL, gum cards, acetates, and mark-sense forms were archived at the ADF&G office in Anchorage. Computer files were archived by ADF&G in the Anchorage and Bethel offices.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrologic conditions were recorded daily at 0700 and 1700. Cloud cover was estimated by percent covered and elevation; wind speed was estimated in miles per hour and direction was noted; precipitation was measured in inches per 24 hours, daily air and water temperature were recorded in degrees Celsius. The river gage height was recorded daily and coincided with a benchmark established in 2001, consisting of a three-quarter inch diameter steel rebar driven into the river bed adjacent to the camp. The benchmark was re-established in 2011 and now consists of an aluminum rod placed near the original bench mark. A marked height on the benchmark represents a river stage of 100 cm. The river gage was a steel rule installed near shore in the river and the 100 cm mark was set level with the benchmark to measure relative water level between years.

RESULTS

WEIR OPERATIONS

There is not a target operational date for the Kanektok weir; however, optimal start time is in late June. In 2011, the weir was operated from 27 June through 15 August. Ice break-up and

unfavorable water conditions hindered early installation of the weir. The weir was removed in mid-August, before heavy rainfall could raise water levels.

Breach events occurred several times during the season. Five breach events in the weir resulted from broken weir panel pickets: 5 July for 24 hours; 6 July for 18.5 hours; 14 July for 22 hours; 23 July for 9 hours; and 8 August for 22 hours. One breach event resulted from scouring under the rail on 28 July through 30 July. Estimates of passage during breach events were not included in total escapements.

SALMON ESCAPEMENT

The total Chinook salmon escapement at the weir in 2011 was estimated to be 5,032 fish. Based on the operational period the median passage date was 23 July and the central 50% of the run occurred between 17 July and 28 July (Table 1).

The total sockeye salmon escapement was estimated to be 84,805 fish. Based on the operational period the median passage date was 11 July and the central 50% of the run occurred between 6 July and 18 July (Table 1).

The total chum salmon escapement was estimated to be 50,908 fish. Based on the operational period the median passage date was 20 July and the central 50% of the run occurred between 14 July and 28 July (Table 1).

Observed passage of coho salmon, during operational period, was 5,779 fish. The first coho salmon were observed on 20 July. Passage upstream continued after weir operations ceased on 15 August. The total escapement of coho salmon is unknown. Only the proportion of passage that occurred during the operational period was monitored (Table 1).

The total count of pink salmon through the weir was 491 fish (Table 2). Passage estimates are not made for pink salmon.

Dolly Varden, whitefish, and rainbow trout were also counted through the weir. Passage estimates are not made for non-salmon species. A total of 30,788 Dolly Varden, 59 whitefish, and 151 rainbow trout were observed passing upstream during project operations. The median passage date for Dolly Varden occurred on 28 July. Approximately 50% of the run arrived between 22 and 3 August, and the date of peak passage was 23 July (3,297 fish). Dolly Varden passage through the weir continued through the last day of operation (Table 2).

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Escapement

Minimum sample objectives were met for Chinook, sockeye, and chum salmon. No scale samples were collected from coho salmon at the weir in 2011.

Age, sex, and length samples were collected from 186 Chinook salmon at the weir in 2011. Age was determined for 159 (85.5%) of the Chinook salmon sampled. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±7.8%. Applied to escapement, age-1.2 was the most abundant age class for Chinook salmon (59.2%), followed by age-1.3 (27.9%), and age-1.4 (12.9%). Sex composition estimated from sampled fish was 78% male and 22% female. Mean male length from sampled fish was 523 mm for age-1.2, 676 mm for age-1.3, and 876 mm for age-1.4 fish. Mean female length from sampled fish was 544 mm

for age-1.2 769 mm for age-1.3 and 865 mm for age-1.4 fish. Overall, male lengths ranged from 439 to 917 mm and female lengths ranged from 434 to 938 mm (Table 3).

ASL samples were collected from 843 sockeye salmon at the weir in 2011. Age was determined for 697 (82.7%) of the sockeye salmon sampled. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±4.0%. Applied to escapement, age-1.3 was the most abundant age class for sockeye salmon (48%), followed by age-1.2 (40%). Sex composition estimated from sampled fish was 49.2% male and 50.8% female. Mean male length from sampled fish was 534 mm for age-1.2 and 583 mm for age-1.3 fish. Mean female length from sampled fish was 499 mm for age-1.2 and 550 mm for age-1.3 fish. Overall, male lengths ranged from 422 to 658 mm and female lengths ranged from 426 to 604 mm (Table 4).

ASL samples were collected from 965 chum salmon at the weir in 2011. Age was determined for 936 (97.1%) of the chum salmon sampled. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±3.1%. Applied to escapement, age-0.4 was the most abundant age class for chum salmon (53.8%), followed by age-0.3 (44.7%). Sex composition estimated from sampled fish was 48.1% male and 51.9% female. Mean male length from sampled fish was 583 mm for age-0.3 and 593 mm for age-0.4 fish. Mean female length from sampled fish was 548 mm for age-0.3 and 560 mm for age-0.4 fish. Overall, male lengths ranged from 451 to 695 mm and female lengths ranged from 447 to 647 mm (Table 5).

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological observations were recorded daily from 04 June through 22 August (Table 6). Air temperatures ranged from 0° to 27° C. Water temperature ranged from 5° to 13° C. Approximately 8.65 inches (≈ 21.96 cm) of rain occurred throughout the entire season. The largest single rain event occurred on 11 July and resulted in an accumulation of 1 inch (≈ 2.54 cm) during this 24 hour period. The Kanektok River weir experienced heavy rain events in 2011, but water level stayed within operable range. Water levels at the weir site based on the set bench mark ranged from approximately -1 to 45 cm for the recorded period. A recorded level below zero occurs when the water level is more than 100 cm below the set bench mark.

DISCUSSION

WEIR OPERATIONS

Operation of the weir in 2011 was generally successful and the majority of the Chinook, sockeye, and chum salmon escapement was observed. Total enumeration of coho salmon was not possible because the coho salmon run continued well after the end of operations in 2011.

Reoccurring periods of high water in mid-September has complicated late season removal of the weir in past years. ADF&G, in consultation with NVK and USFWS determined removal of the weir should occur in mid-August; prior to the period that high water normally occurs. Early weir removal was successful, all equipment including rails and cable were removed. Removal prevents weir component damage from overwintering in the river, as experienced in 2005 (Jones and Linderman 2006). The rail and cable were removed to allow smoothing of the river bed substrate and to replace damaged rails.

ESCAPEMENT MONITORING AND ESTIMATES

The Chinook salmon escapement estimate for 2011 was the lowest escapement among 9 years of collected data (2002–2010; Figure 3; Appendix A). Low Chinook salmon escapement estimates were also reported for several tributaries in the Kuskokwim Area (C. Brazil, Fishery Biologist, ADF&G Division of Commercial Fisheries Anchorage; personal communication). Chinook salmon run timing was later then the historical average (Figure 4).

The sockeye salmon escapement estimate for 2011 was lower than average and the second lowest among 9 years of collected data (2002–2010; Figure 3; Appendix A). Sockeye salmon run timing was near average (Figure 4).

The estimated chum salmon escapement in 2011 was near the historical average from 2002 through 2010 (Figure 3; Appendix A). Run timing was near average (Figure 4). The weir results do not account for the large number of chum salmon, perhaps in excess of weir escapements, known to spawn downstream of the weir.

The escapement of coho salmon in 2011 represents the portion of the run enumerated during the weir operation period. (Appendix A). A low escapement count was expected due to counts ending before peak coho salmon migration in September. Median passage date historically occurs in late August and the central 50% of the run occurs between late August and early September (Clark and Linderman 2009).

Passage estimates were not included in the total escapements. Breach areas were small and occurred in areas of low activity. Due to low overall passage it was determined that missed passage would not have a significant effect on overall run timing results.

The observed escapement of Dolly Varden in 2011 was higher than the 2002 to 2010 average of 16,899. However, the count was down from the 2010 peak (43,292). Previously the high count of 26,056 fish occurred in 2009. Prior to 2009 the largest run observed was 15,674 in 2002 (Lisac 2011). The 2010 and 2011 escapement counts have shown a large increase from previous historical high counts. Dolly Varden run timing appeared to be average and the median passage date occurred 3 days after the historical average (25 July; Table 2). The observed escapement does not include fish small enough to pass between pickets. The proportion of spawning fish to non-spawning fish was not determined. It is important to determine the proportion of spawning fish because Dolly Varden are known to overwinter in aggregates of mixed stocks (DeCicco 1992; Whalen 1992) and comparing total run estimates at the weir can be misleading for long term monitoring efforts.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Trapping Chinook salmon for ASL sampling has proven to be problematic. Chinook salmon are generally reluctant to enter the trap when other fish species are present or when the fyke doors on the trap are set, constricting the entrance. Historically, it has been problematic in most years to successfully achieve ASL pulse sampling goals. Sampling goals were changed for 2011 to a proportional method to better represent the total escapement. The Chinook salmon escapement ASL objective was met in 2011. The samples were divided into three strata based on proportions of cumulative escapement. The ASL compositions from the three strata are represented in a weighted total.

Sockeye and chum salmon ASL sampling objectives were met in 2011. Generally, salmon sex and age composition changes slightly over the course of the run. Sockeye and chum salmon sampling goals were also adjusted. Previous pulse based sampling minimums were difficult to obtain during the initial third and the tail third of the runs when weekly counts may be less than the sample objectives for each pulse period. Adjusting sampling goals to reflect a set portion of the cumulative passage has alleviated problems encountered from low abundance during the runs.

Sockeye salmon samples were divided into two strata. A weighted total is presented. Sockeye salmon age-1.3 and age-1.2 dominated escapement age class estimates in 2011. The contributions of age-1.3 and age-1.2 fish in 2011 were near the average observed in previous years (Table 4; Figure 5). When compared to 2010, there was a major reduction in the number of age-1.3 fish and an increase in the number of age-1.2 fish (Taylor and Elison 2012).

Chum salmon samples were divided into three strata. A weighted total is presented. Chum salmon age-0.4 was the dominant age class for escapement age class estimates and comprised approximately 54% of the weir escapement (Table 5). Historically the two predominant age classes are age-0.3 and -0.4 fish. Generally age-0.3 has been the dominant age class in odd years; whereas, age-0.4 have dominated the even years (Figure 5). This generalization was not present in 2010 or 2011. Based on odd year results, age-0.4 fish showed a higher proportional return than average and the proportion of age-0.3 fish was below average.

RECOMMENDATIONS

Establishing long-term funding for the project would help provide long-term escapement, run timing, and ASL data required to better understand productivity of the Kanektok River. Long-term data sets could be used to develop river escapement goals on monitored species. This project also collects data sufficient to create brood tables for spawner-recruit analyses.

Early installation in 2009, 2010, and 2011 did not prove cost effective and is no longer recommended. Early installation may occur as conditions permit. To the extent feasible, aerial monitoring of water level at the weir site should be conducted in mid- to late-April each year to assess conditions for possible early installation. The Kanektok River has demonstrated high water level and water flow in May and June, which often leads to substantial delay in installation until July or later depending on the severity and duration of high water conditions. Late season high water conditions call for removal of the weir in mid- to late-August to avoid complications. Operating until mid-August can still capture the Chinook, sockeye and chum salmon, and Dolly Varden runs.

ACKNOWLEDGMENTS

The authors would like to thank; Brian Latham, Thaddeus Foster and Cameron Lingnau with ADF&G and Jackie Cleveland with NVK. Thanks also to the technicians provided by NVK; Kyle Church, and Kianna Puttman, as well as John Cleveland for their work this season. The authors would also like to thank Mark Lisac with the USFWS, TNWR for his contributions to project operations, logistics, and planning. The USFWS, Office of Subsistence Management, provided $104,000 in funding support for this project (OSM 10-300) through the Fisheries Resource Monitoring Program, under agreement number 70181AJ027. Coastal Villages Region Fund provided $64,510 in funding support for this project through a cooperative agreement with

NVK. An additional $25,000 was provided by Coastal Village Seafoods to ADF&G for resistance board replacement and weir operations through a standard agreement.

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TABLES AND FIGURES

Table 1.–Daily and cumulative Chinook, sockeye, chum, and coho salmon passage, Kanektok River weir, 2011.

	Chinook			Sockeye			Chum			Coho	
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.
06/27	0	0	0	285	285	0	29	29	0	0	0
06/28	3	3	0	517	802	1	43	72	0	0	0
06/29	1	4	0	907	1,709	2	95	167	0	0	0
06/30	3	7	0	1,355	3,064	4	205	372	1	0	0
07/01	27	34	1	2,989	6,053	7	529	901	2	0	0
07/02	26	60	1	3,650	9,703	11	462	1,363	3	0	0
07/03	30	90	2	3,873	13,576	16	815	2,178	4	0	0
07/04	41	131	3	3,423	16,999	20	717	2,895	6	0	0
07/05	46 [a]	177	4	3,525 [a]	20,524	24	819 [a]	3,714	7	0 [a]	0
07/06	44 [a]	221	4	4,402 [a]	24,926	29	847 [a]	4,561	9	0 [a]	0
07/07	56	277	6	3,762	28,688	34	512	5,073	10	0	0
07/08	36	313	6	5,100	33,788	40	966	6,039	12	0	0
07/09	68	381	8	4,379	38,167	45	1,236	7,275	14	0	0
07/10	95	476	9	3,360	41,527	49	1,215	8,490	17	0	0
07/11	61	537	11	3,052	44,579	**53**	1,526	10,016	20	0	0
07/12	70	607	12	3,182	47,761	56	1,198	11,214	22	0	0
07/13	45	652	13	2,832	50,593	60	700	11,914	23	0	0
07/14	121 [a]	773	15	2,406 [a]	52,999	62	1,000 [a]	12,914	25	0 [a]	0
07/15	69	842	17	2,055	55,054	65	1,612	14,526	29	0	0
07/16	225	1,067	21	2,911	57,965	68	1,663	16,189	32	0	0
07/17	236	1,303	26	2,897	60,862	72	3,699	19,888	39	0	0
07/18	200	1,503	30	2,603	63,465	75	1,643	21,531	42	0	0
07/19	246	1,749	35	2,304	65,769	78	1,920	23,451	46	0	0
07/20	335	2,084	41	3,079	68,848	81	3,480	26,931	**53**	3	3
07/21	197	2,281	45	1,915	70,763	83	1,567	28,498	56	2	5
07/22	122	2,403	48	1,760	72,523	86	1,403	29,901	59	4	9
07/23	296 [a]	2,699	**54**	2,364 [a]	74,887	88	2,680 [a]	32,581	64	7 [a]	16
07/24	194	2,893	57	1,022	75,909	90	952	33,533	66	5	21
07/25	255	3,148	63	1,036	76,945	91	1,527	35,060	69	6	27
07/26	285	3,433	68	1,008	77,953	92	1,228	36,288	71	31	58
07/27	159	3,592	71	672	78,625	93	1,621	37,909	74	37	95
07/28	191 [a]	3,783	75	676 [a]	79,301	94	1,372 [a]	39,281	77	55 [a]	150
07/29	128 [a]	3,911	78	572 [a]	79,873	94	947 [a]	40,228	79	39 [a]	189
07/30	86 [a]	3,997	79	324 [a]	80,197	95	450 [a]	40,678	80	21 [a]	210
07/31	102	4,099	81	354	80,551	95	780	41,458	81	17	227
08/01	81	4,180	83	501	81,052	96	1,214	42,672	84	64	291

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Table 1.–Page 2 of 2.

	Chinook			Sockeye			Chum			Coho	
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.
08/02	118	4,298	85	519	81,571	96	1,256	43,928	86	67	358
08/03	98	4,396	87	478	82,049	97	1,361	45,289	89	59	417
08/04	81	4,477	89	543	82,592	97	1,029	46,318	91	90	507
08/05	98	4,575	91	292	82,884	98	536	46,854	92	123	630
08/06	72	4,647	92	333	83,217	98	634	47,488	93	137	767
08/07	40	4,687	93	252	83,469	98	456	47,944	94	137	904
08/08	29 [a]	4,716	94	171 [a]	83,640	99	342 [a]	48,286	95	164 [a]	1,068
08/09	83	4,799	95	151	83,791	99	401	48,687	96	278	1,346
08/10	73	4,872	97	338	84,129	99	558	49,245	97	718	2,064
08/11	56	4,928	98	250	84,379	99	551	49,796	98	781	2,845
08/12	38	4,966	99	145	84,524	100	386	50,182	99	715	3,560
08/13	24	4,990	99	129	84,653	100	392	50,574	99	847	4,407
08/14	31	5,021	100	96	84,749	100	232	50,806	100	781	5,188
08/15	11	5,032	100	56	84,805	100	102	50,908	100	591	5,779
Total	5,032			84,805			50,908			5,779	
Observed	5,032			84,805			50,908			5,779	
Estimated	0			0			0			0	
% Observed	100.0			100.0			100.0			100.0	

Note: Missed passage during breach events was determined to be negligible. Breaches were small and in areas of slow fish movement. Outside boxes indicate 80% of the run, inside boxes indicate the estimated central 50% of passage and bold boxes indicate the date that the estimated cumulative 50% passage occurred.

[a] A breach occurred in the weir, daily passage was not estimated.

Table 2.–Daily and cumulative pink salmon, Dolly Varden, whitefish, and rainbow trout passage, Kanektok River weir, 2011.

	Pink Salmon		Dolly Varden		Whitefish		Rainbow Trout		Grayling	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
06/27	0	0	0	0	0	0	0	0	0	0
06/28	0	0	0	0	0	0	1	1	0	0
06/29	0	0	0	0	1	1	0	1	0	0
06/30	0	0	4	4	0	1	1	2	0	0
07/01	0	0	2	6	0	1	0	2	1	1
07/02	0	0	5	11	0	1	1	3	1	2
07/03	0	0	11	22	0	1	2	5	1	3
07/04	0	0	5	27	0	1	11	16	4	7
07/05	0[a]	0	11[a]	38	0[a]	1	6[a]	22	6[a]	13
07/06	0[a]	0	15[a]	53	1[a]	2	1[a]	23	6[a]	19
07/07	0	0	25	78	2	4	4	27	0	19
07/08	0	0	13	91	0	4	0	27	1	20
07/09	0	0	45	136	0	4	2	29	0	20
07/10	0	0	38	174	0	4	4	33	2	22
07/11	0	0	21	195	1	5	7	40	0	22
07/12	3	3	20	215	0	5	3	43	0	22
07/13	1	4	20	235	2	7	5	48	0	22
07/14	6[a]	10	32[a]	267	1[a]	8	6[a]	54	3[a]	25
07/15	7	17	86	353	1	9	6	60	2	27
07/16	17	34	258	611	6	15	17	77	2	29
07/17	19	53	566	1,177	2	17	7	84	1	30
07/18	13	66	486	1,663	1	18	5	89	1	31
07/19	17	83	651	2,314	2	20	5	94	4	35
07/20	55	138	3,161	5,475	1	21	9	103	1	36
07/21	30	168	1,055	6,530	3	24	1	104	0	36
07/22	27	195	1,027	7,557	0	24	3	107	0	36
07/23	106[a]	301	3,297[a]	10,854	1[a]	25	5[a]	112	0[a]	36
07/24	20	321	1,043	11,897	2	27	1	113	0	36
07/25	9	330	673	12,570	3	30	1	114	1	37
07/26	25	355	866	13,436	0	30	3	117	1	38
07/27	38	393	1,336	14,772	2	32	1	118	1	39
07/28	27[a]	420	2,450[a]	17,222	1[a]	33	5[a]	123	0[a]	39
07/29	21[a]	441	1,855[a]	19,077	1[a]	34	7[a]	130	0[a]	39
07/30	3[a]	444	909[a]	19,986	5[a]	39	3[a]	133	0[a]	39
07/31	8	452	651	20,637	2	41	1	134	0	39
08/01	8	460	913	21,550	7	48	0	134	6	45

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Table 2.–Page 2 of 2.

	Pink Salmon		Dolly Varden		Whitefish		Rainbow Trout		Grayling	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
08/02	4	464	767	22,317	1	49	3	137	0	45
08/03	12	476	698	23,015	2	51	2	139	1	46
08/04	3	479	937	23,952	1	52	3	142	0	46
08/05	0	479	266	24,218	1	53	1	143	0	46
08/06	3	482	257	24,475	1	54	1	144	0	46
08/07	3	485	225	24,700	1	55	1	145	0	46
08/08	1[a]	486	212[a]	24,912	0[a]	55	0[a]	145	0[a]	46
08/09	1	487	271	25,183	1	56	1	146	0	46
08/10	3	490	1,128	26,311	2	58	1	147	0	46
08/11	0	490	2,348	28,659	1	59	0	147	0	46
08/12	0	490	1,041	29,700	0	59	3	150	1	47
08/13	1	491	682	30,382	0	59	0	150	0	47
08/14	0	491	307	30,689	0	59	1	151	0	47
08/15	0	491	99	30,788	0	59	0	151	0	47
Total	491		30,788		59		151		47	

[a] A breach occurred in the weir, daily passage was not estimated.

Table 3.–Chinook salmon age and sex composition and mean length (mm), Kamektok River weir 2011.

			2007		2006		2005			
	Sample		1.2		1.3		1.4		Total	
	Size		N	%	N	%	N	%	N	%
Total [a]	159	Male	2,607	51.8	1,217	24.2	100	2.0	3,924	78.0
		Female	374	7.4	186	3.7	548	10.9	1,108	22.0
		Total	2,981	59.2	1,403	27.9	648	12.9	5,032	100.0
		95% C. I.	7.8		7.1		5.1			
		Male Mean Length		523		676		867		
		SE		4.65		12.61		24.00		
		Range		439-649		511-877		838-917		
		n		83		37		3		
		Female Mean Length		544		769		865		
		SE		21.12		20.99		13.72		
		Range		434-598		710-828		782-938		
		n		11		6		19		

[a] Samples were divided into 3 strata based on proportions of cumulative escapement. A weighted total is presented.

Table 4.–Sockeye salmon age and sex composition and mean length (mm), Kanektok River weir, 2011.

		2008		2007		2007		2006		2006		2006		2005		2005		2004			
Sample		0.2		0.3		1.2		0.4		1.3		2.2		1.4		2.3		3.3		Total	
Size		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
697	Male	790	0.9	1,348	1.6	17,302	20.4	0	0.0	20,234	23.9	1,287	1.5	248	0.3	468	0.6	73	0.1	41,752	49.2
Total[a]	Female	0	0.0	1,947	2.3	16,622	19.6	147	0.2	20,508	24.2	2,163	2.6	1,169	1.4	497	0.6	0	0.0	43,053	50.8
	Total	790	0.9	3,296	3.9	33,924	40.0	147	0.2	40,742	48.0	3,450	4.1	1,417	1.7	965	1.1	73	0.1	84,805	100.0
	95% C. I.	3.2		1.3		3.9				4.0		1.6		1.0		0.80		0.28			
	Male Mean Length	573		577		534		-		583		538		614		550		538			
	SE	13.40		9.38		2.22		-		2.41		11.53		-		21.03		-			
	Range	555-594		494-658		422-607		0-0		423-643		514-586		603-638		532-642		538-538			
	n	8		17		136		-		151		12		2		5		1			
	Female Mean Length	-		549		499		579		550		496		564		555		-			
	SE	-		5.35		2.41		11.50		2.00		6.37		8.12		9.05		-			
	Range	0-0		518-571		426-576		567-590		435-604		456-534		533-601		502-568		0-0			
	n	-		21		142		2		170		17		9		4		-			

[a] Samples were divided into 2 strata based on proportions of cumulative escapement. A weighted total is presented.

Table 5.–Chum salmon age and sex composition and mean length (mm), Kanektok River weir, 2011.

		2008		2007		2006		2005			
Sample		0.2		0.3		0.4		0.5		Total	
Size		N	%	N	%	N	%	N	%	N	%
936	Male	44	0.1	10,904	21.4	13,208	25.9	329	0.6	24,485	48.1
Total [a]	Female	44	0.1	11,838	23.3	14,204	27.9	337	0.7	26,423	51.9
	Total	88	0.2	22,742	44.7	27,412	53.8	666	1.3	50,908	100.0
	95% C. I.	0.26		3.1		3.1		0.71			
	Male Mean Length		522		583		593		579		
	SE		-		2.11		2.10		12.26		
	Range		522-522		451-695		466-671		534-629		
	n		1		203		234		6		
	Female Mean Length		475		548		560		562		
	SE		-		2.11		1.77		5.16		
	Range		475-475		447-613		471-647		516-585		
	n		1		229		255		7		

[a] Samples were divided into 3 strata based on proportions of cumulative escapement. A weighted total is presented.

Table 6.–Daily weather and hydrological observations from the Kanektok River weir site, 2011.

Date	Wind (Dir/ Speed)	Precip (in)	Air Temp. (C)		Water Temp. (C)		Cloud Cover % / altitude	Water level (cm)	
			am	pm	am	pm		am	pm
4 Jun	E/10	0.04	8	10	6	6.5	100/2000	34	45
5 Jun	E/5	trace	10	12	5	7	95/2000	39	37
6 Jun	E/5	trace	10	13	5	6	50/2700	35	32
7 Jun	calm	0.19	9	11	5	6	100/2500	30	29
8 Jun	calm	0.15	9	10	5	7	100/2300	26	25
9 Jun	S/3	0.05	9	9	6	7	100/2000	26	24
10 Jun	-	-	-	-	-	-	-	-	-
11 Jun	-	-	-	-	-	-	-	-	-
12 Jun	-	-	-	-	-	-	-	-	-
13 Jun	SW/5	0.17	5	-	7	-	100/2000	23	-
14 Jun	-	-	-	-	-	-	-	-	-
15 Jun	S/3	0.24	22	-	9	-	70/2800	19	-
16 Jun	E/5	0.01	9	15	7	9	80/2500	17	17
17 Jun	NE/3	0.00	12	15	8	9	100/3000	17	16
18 Jun	E/3	0.03	9	17	8	8	100/2000	16	15
19 Jun	SW/1	0.13	8	11.5	7.5	8	100/500	17	17
20 Jun	SW/3	0.03	8	12	8	9	100/fog	20	23
21 Jun	SW/3	trace	8	6	7	7	100/2500	20	20
22 Jun	SW/1	0.15	6	8	7	7.5	100/2400	23	22
23 Jun	E/2	0.03	8	11	8	8	95/4000	20	20
24 Jun	calm	0.05	9	12	7.5	8	100/3000	18	17
25 Jun	calm	0.13	11	14	9	10	95/5000	17	17
26 Jun	E/10	0.06	12	9	8	9	95/3000	17	17
27 Jun	SE/5	0.03	6	9	8	8.5	100/1500	17	19
28 Jun	SE/2	0.01	9	5	7	7	100/900	20	20
29 Jun	NE/1	0.08	2	11	7	9	5/1000	20	19
30 Jun	calm	0.03	4	10	7.5	9	100/500	17	17
1 Jul	calm	0.01	4	15	8	10	100/fog	15	14
2 Jul	NW/1	0.06	6	21	8.5	10	100/fog	14	13
3 Jul	calm	0.01	8	18	9	12	100/fog	12	12
4 Jul	calm	0.00	3	19	8	10	100/fog	11	10
5 Jul	E/5	0.00	5	15	8	9.5	100/8000	9	9
6 Jul	E/3	0.00	7	10	8	8	100/1000	8	8
7 Jul	SE/3	0.07	9	14	7.5	9	100/1800	9	9
8 Jul	SE/3	0.07	8	14	8.5	9	100/1100	10	9
9 Jul	SW/5	0.54	11	14	8	9	100/2400	11	12
10 Jul	calm	0.09	9	16	9	8	100/500	11	11
11 Jul	SE/20	1.00	11	12	9	10	100/500	11	13

-continued-

Table 6.–Page 2 of 2.

Date	Wind (Dir/ Speed)	Precip (in)	Air Temp. (C)		Water Temp. (C)		Cloud Cover % / altitude	Water level (cm)	
12 Jul	calm	0.08	5	12	8	7	100/2400	15	15
13 Jul	calm	0.00	6	9	8	8	100/500	15	14.5
14 Jul	SE/1	0.01	6	12	8	9	100/500	13	12
15 Jul	NE/3	0.00	5	8	8	8	100/500	11	11
16 Jul	SE/1	0.01	10	19	8	12	100/300	9	8
17 Jul	SE/1	0.25	8	11	9	9.5	100/400	8	10
18 Jul	calm	0.18	6	11	8	10	98/2500	10	8
19 Jul	calm	0.00	5	27	9	11	100/100	6	6
20 Jul	SE/5	0.00	13	17	10	11	25/3000	4	4
21 Jul	SE/2	0.10	6	15	9	10	90/1000	4	3.5
22 Jul	calm	0.02	8	21	9	11.5	100/200	2	2
23 Jul	SE/5	0.20	11	10	10	10	100/1000	1	1
24 Jul	E/1	0.30	7	11	8.5	9	100/500	3	5
25 Jul	NW/1	0.40	7.5	14	8.5	9	100/1000	8	8
26 Jul	calm	0.02	9	21	9	10	99/1000	6	5
27 Jul	calm	0.15	8	17	9	12	100/100 fog	6	5
28 Jul	calm	0.14	9	16	9	12	100/200 fog	6	6
29 Jul	SW/5	0.30	7	11	10	13	100/100 fog	5	5
30 Jul	calm	0.02	7	7	9	9	100/2500	5	4
31 Jul	calm	0.05	7	10	8.5	9	100/500	4	4
1 Aug	SE/3	0.32	7	10	8.5	10	100/500 fog	6	6
2 Aug	calm	0.30	9	15	9	10.5	100/fog	6	6
3 Aug	calm	0.02	5	15	9	11	100/fog	4	4
4 Aug	SE/3	0.2	5	6	8	9.5	100/2000	4	6
5 Aug	calm	0.28	12	11	8	9	100/2000	10	12
6 Aug	SE/10	0.06	4	7	8	9.5	100/1500	9	8
7 Aug	calm	0.08	4	7	8	8	100/fog	11	11
8 Aug	SE/3	0.20	4	7	7	7.5	100/1200	14	15
9 Aug	calm	0.29	6	11	7.5	9	100/100 fog	19	19
10 Aug	calm	0.02	6	15	8.5	9.5	100/100 foig	18	17
11 Aug	calm	0.00	7	17	9	10	100/fog	16	15
12 Aug	W/5	0.12	11	10	9	10	100/fog	17	19
13 Aug	calm	0.34	9	12	9.5	10.5	100/fog	22	20
14 Aug	W/3	0.14	8	10	9.5	9.5	100/500	19	18
15 Aug	calm	0.04	11	17	9.5	11	100/fog	17	16
16 Aug	calm	trace	0	20	9	11	20/3000	15	9
17 Aug	NW/3	0.00	7	25	9	11	30/5000	8	3
18 Aug	SE/3	0.00	17	14	10	10	100/5000	3	2
19 Aug	SE/3	0.16	10	-	9	-	100/2500	2	3
20 Aug	NW/3	0.20	11	-	9	-	100/1000	5	4
21 Aug	NW/1	0.18	6	-	9	-	100/800	2	-
22 Aug	calm	0.01	6	-	9	-	100/800	-1	-

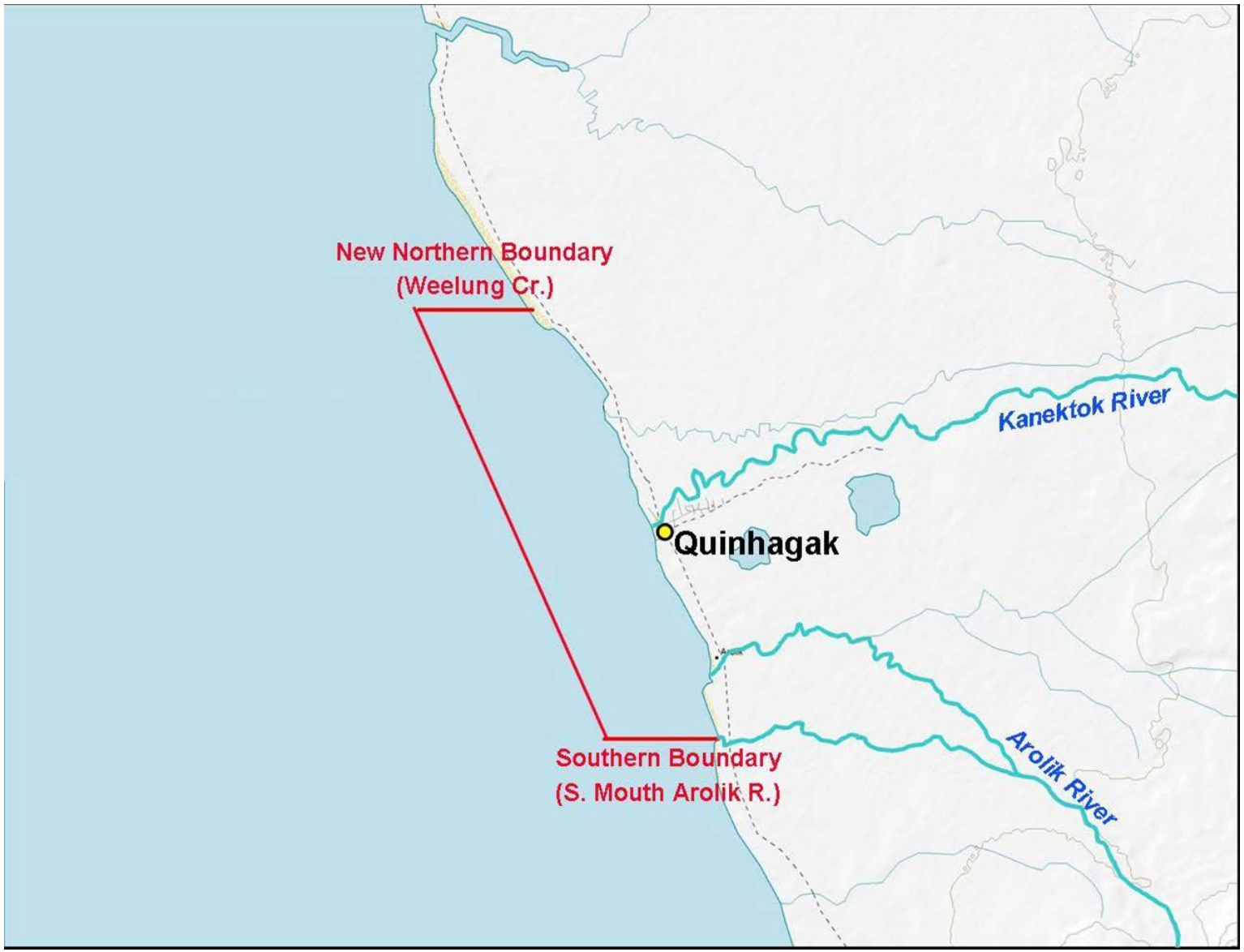


Figure 1.–Commercial Fishing District W-4, Kuskokwim Bay, Alaska, 2011.

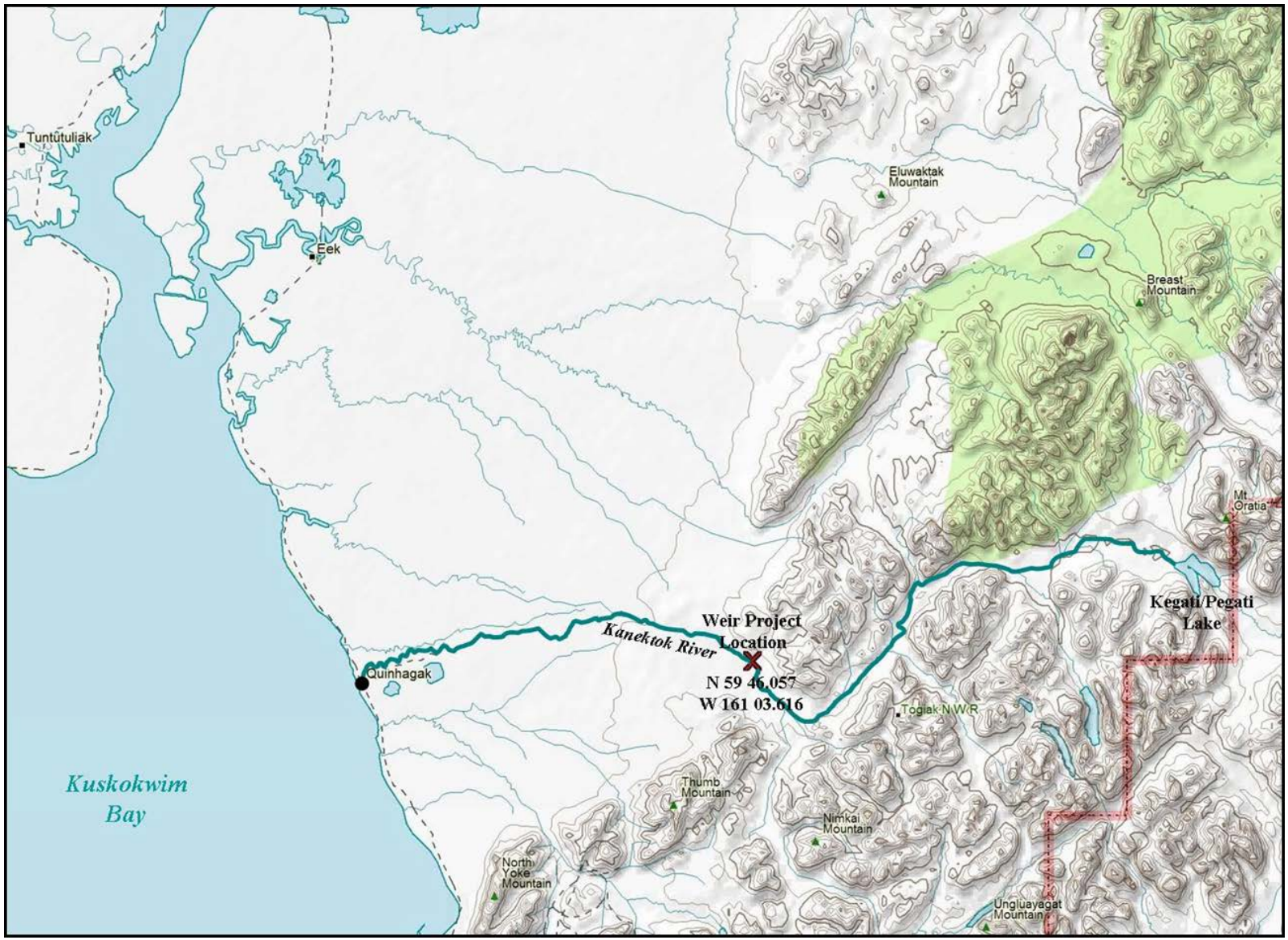


Figure 2.–Kanektok River, Kuskokwim Bay, Alaska.

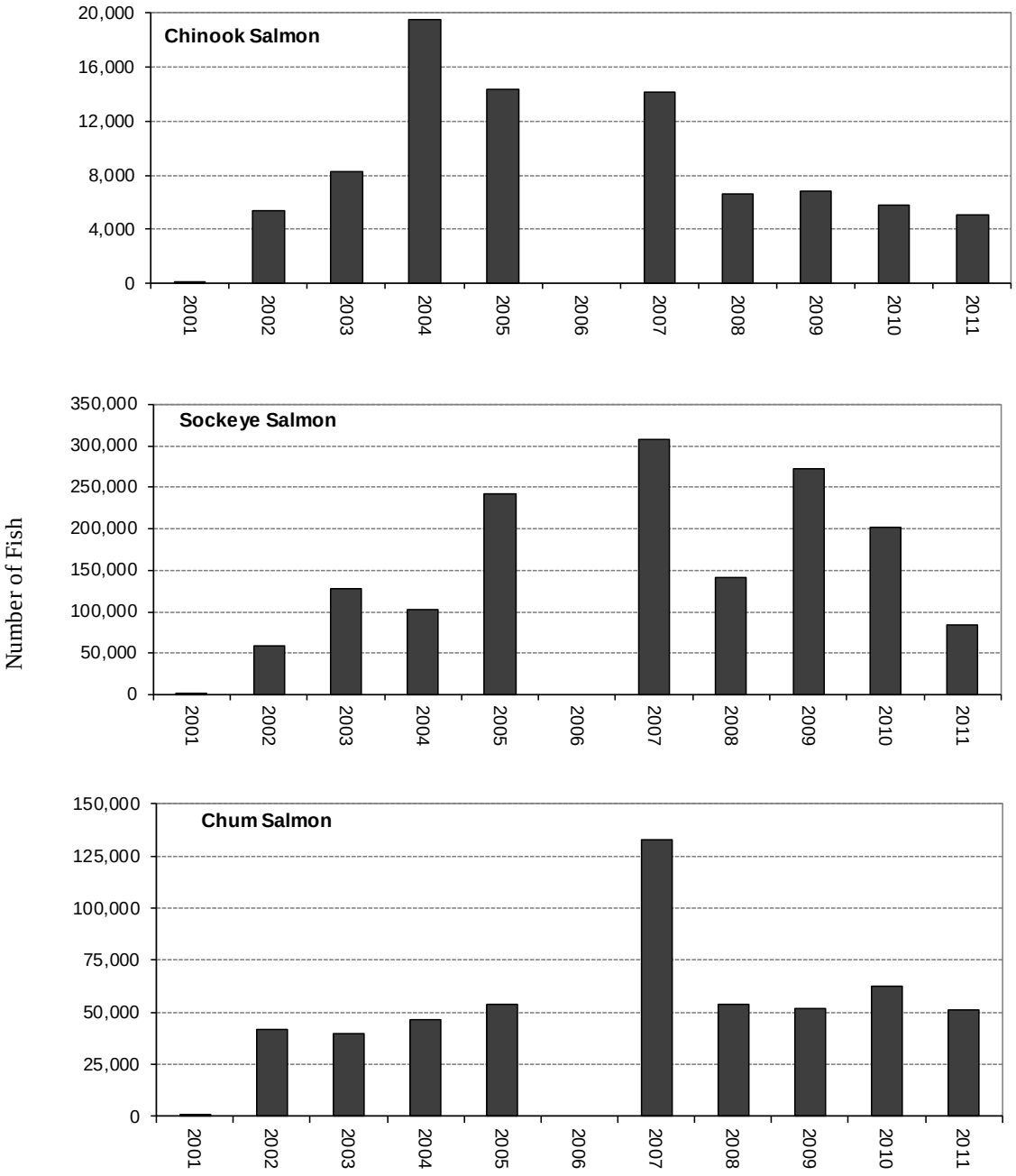
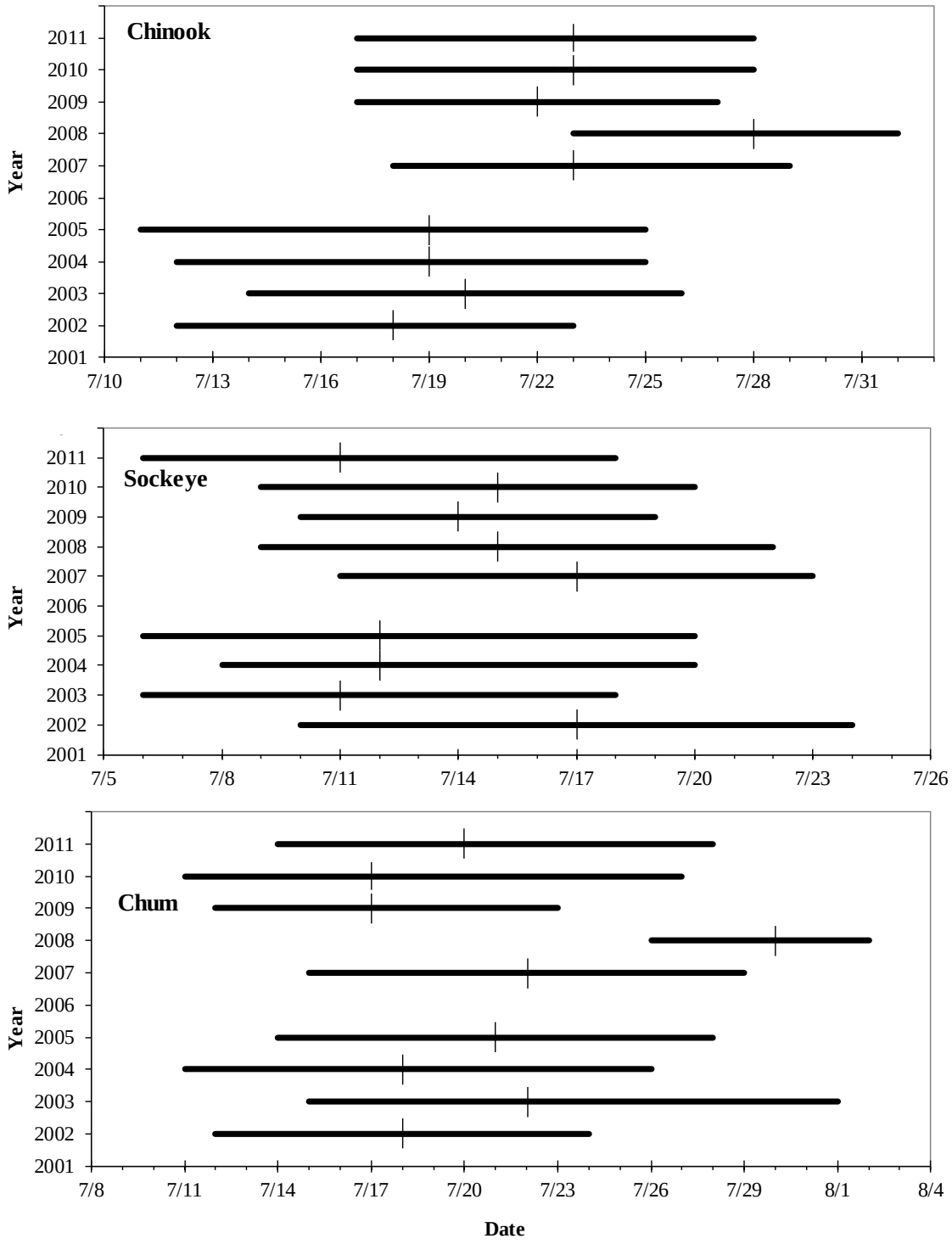
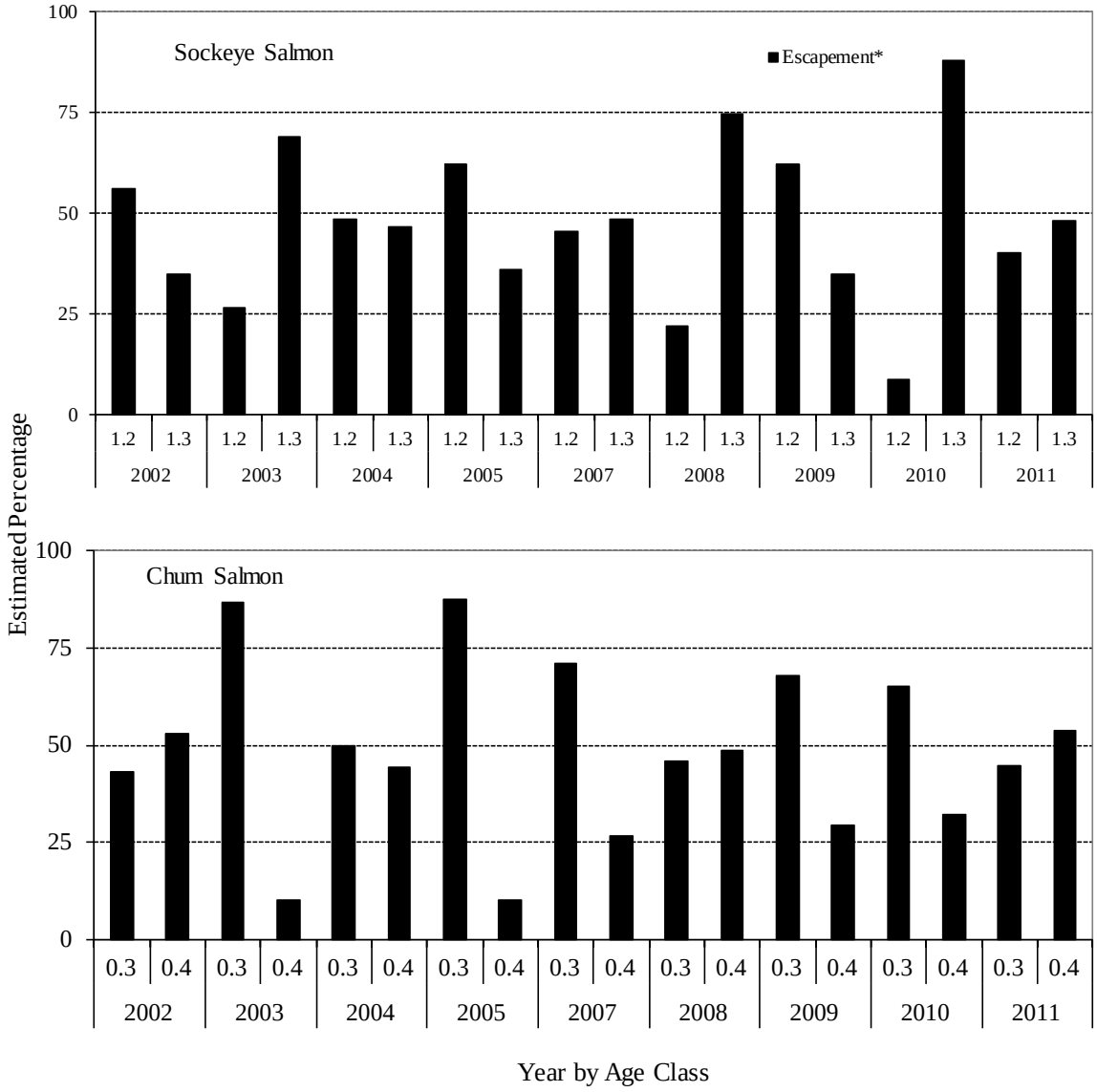


Figure 3.–Historical escapement of Chinook, sockeye, and chum salmon at the Kanektok River weir.



Note: Solid lines represent the dates when the central 50% of the run passed, cross-bars represent the median passage date.

Figure 4.–Annual run timing of Chinook, sockeye and chum salmon based on cumulative percent passage at the Kanektok River weir, 2001–2011.



Note: 2005 escapement ASL data does not represent estimated escapement as it is based on escapement observed and samples collected during weir operations only. 2008 escapement percentages are based on actual samples collected and do not represent total escapement.

Figure 5.–Percentage of age-1.2 and -1.3 sockeye salmon and age-0.3 and -0.4 chum salmon from Kanektok River weir escapement estimates, 2002–2011.

APPENDIX A: HISTORICAL ESCAPEMENT

Appendix A1.–Historical escapement, Kanektok River escapement projects, 1996 through 2011.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink [a]	Coho
1996	Counting Tower[b]	2–13, 20–25 July	6,827[c]	71,637[c]	70,617[c]	[c]	[c]
1997	Counting Tower[b]	11 June–21 August	16,731	96,348	51,180	7,872	23,172[c]
1998	Counting Tower[b]	23 July–17 August	[c]	[c]	[c]	[c]	
1999	Tower/Weir[b]	Not Operational					
2000	Resistance Board Weir[d]	Not Operational					
2001	Resistance Board Weir[e]	10 August–3 October	132[c]	739[c]	1,056[c]	19[c]	35,650
2002	Resistance Board Weir[e]	1 July–20 September	5,343	58,326	42,009	87,036	24,840
2003	Resistance Board Weir[e]	24 June–18 September	8,231	127,471	40,066	2,443	72,448
2004	Resistance Board Weir[e]	29 June–20 September	19,528	102,867	46,444	98,060	87,828
2005	Resistance Board Weir[e]	8 July-8 September	14,331	242,208	53,580	3,530	26,343
2006	Resistance Board Weir[e]	Not Operational					
2007	Resistance Board Weir[e]	19 June- 11 September	14,120	307,750	133,215	3,075	30,471
2008	Resistance Board Weir[e]	17 July- 21 August	6,578	141,388	54,024	142,430	24,490
2009	Resistance Board Weir[e]	5 July- 11 August	6,841	272,483	51,652	1,246	2,336[c]
2010	Resistance Board Weir[e]	28 June- 5 August	5,800	202,634	62,567	114,074	330[c]
2011	Resistance Board Weir[e]	27 June- 15 August	5,032	84,805	50,908	530	5,779[c]

[a] Picket spacing of the weir panels allows pink salmon to freely pass through the weir unobserved.

[b] Project located approximately 15 river miles from the mouth of the Kanektok River.

[c] No counts or incomplete counts as the project was not operational during a large portion of species migration.

[d] Project located approximately 20 river miles from the mouth of the Kanektok River.

[e] Project located approximately 42 river miles from the mouth of the Kanektok River.